

## The Rufford Foundation Final Report

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Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to [jane@rufford.org](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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### Grant Recipient Details

<b>Your name</b>	Isabel Marques da Silva
<b>Project title</b>	Conservation and Management of Reef Sharks in the Western Indian Ocean through scientific and local community collaborative actions
<b>RSG reference</b>	15567-1
<b>Reporting period</b>	September 2014 to April 2015
<b>Amount of grant</b>	£6000
<b>Your email address</b>	<a href="mailto:isilva@fcn-unilurio.com">isilva@fcn-unilurio.com</a> or <a href="mailto:fis.isabel@gmail.com">fis.isabel@gmail.com</a>
<b>Date of this report</b>	25-4-15

**1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.**

Objective	Not achieved	Partially achieved	Fully achieved	Comments
(i) Elucidate the residency and movement patterns of grey reef sharks at Neptunes, through passive acoustic telemetry tracking;		X		Of the 10 tags purchased, three sharks have been tagged to date. Three acoustic monitor stations deployed.
(ii) Provide capacity building to two local residents on acoustic telemetry methods, equipment maintenance and shark tagging procedures;			X	A dive master from the lodge and a recent graduate student from UniLúrio were trained.
(iii) Engage a Mozambican student to directly interact with the local co-fisheries management programme to educate over the economic benefits of shark tourism and the biology and role of grey reef sharks in maintaining ecosystem health and to further develop monitoring of grey reef shark bycatch in regional fisheries within the co-management programme;			X	Two Mozambicans participated in this activity, one produced the video and the second interacted with the communities, gave talks and also participated in the final meeting to show preliminary results
(vi) Produce a video in Swahili/Portuguese to document the research and economic and ecological value of grey reef sharks that will be used both regionally and nationally given conflict over human-shark resource use in Mozambique; and			X	Final video was produced. We also made a second version in English/Swahili.
(v) Hold a regional workshop with local government officials to highlight shark/human issues and update on project activities			X	More than 40 participants were involved including local people, NGO workers and government, officials.

**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

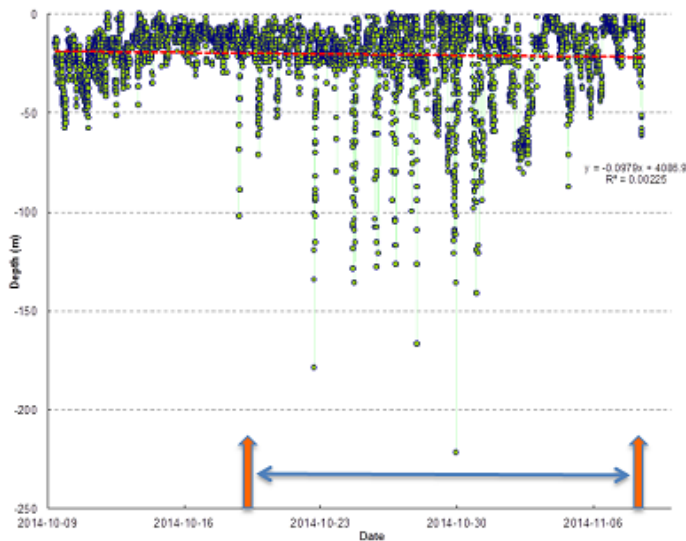
The most challenging aspect of the project was the actual fishing and capture of the sharks for tagging. Neptunes has complex bottom topography, the site is 300 m by 100 m, and consists of vertical pinnacles that restrict the approaches for fishing drop lines. This is further confounded by strong currents on the site. In addition, over the period of fieldwork, there were bad weather conditions which prevented fishing on several days and limited fishing activities on others. Various types of fishing drop lines of different depths were used depending on conditions. In addition, as part of additional funding, both free diving and scuba diving were attempted to attach tags using a spear gun. William Winram, a world champion free diver joined the team to attempt this in water tagging following protocols they have used at several global locations. As with surface fishing, the main limitation to this approach were sea conditions, particularly strong currents. The next field season will adopt fixed bottom lines on break away anchor points to allow fishing independent of sea conditions. The team has been testing these fishing techniques at other field sites in preparation. The free diving approach to tagging is certainly possible if weather conditions were better on the site. During the next field season, the team will organise a longer field season to counter bad weather days and fishing will be undertaken principally during August when weather is typically calmer.

All other aspects of the project were highly successful.

**3. Briefly describe the three most important outcomes of your project.**

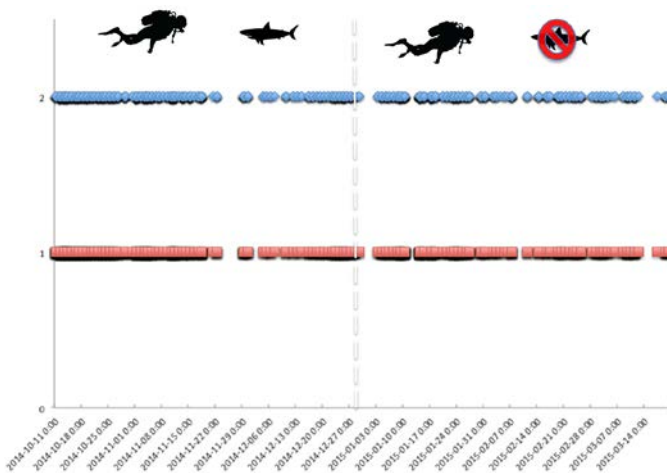
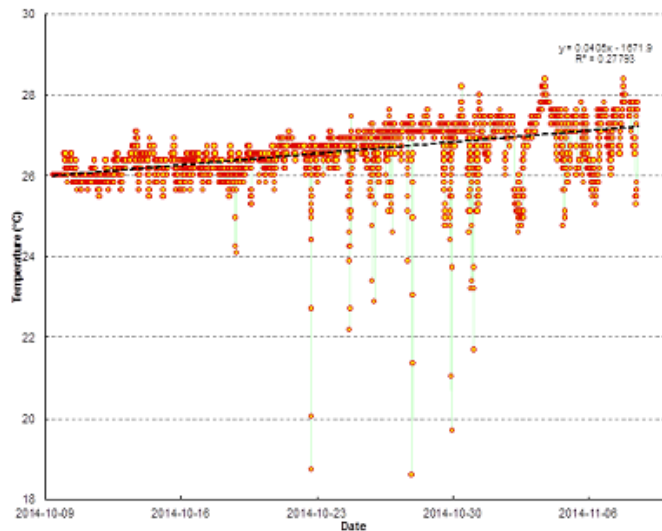
The three most important outcomes were:

(1) We have now monitored two sharks with acoustic tags continuously from September 2014 to present at the site (two monitors), with an additional monitor deployed in the no take marine reserve off Vamizi Island. These two sharks have been detected on the site on a regular basis since tagging. This is a surprising result as the aggregation of sharks is only observed by scuba divers between August and November. These preliminary data suggest these individuals are resident to the site but likely drop deeper tracking the thermocline as the surface water temperature increases. A satellite tag attached to one of the acoustically tagged sharks provided high resolution depth and temperature data (every few minutes for a one month period). These data showed that as the water temperature increased, the shark started undertaking more frequent deep diving behaviour potentially to thermoregulate. Overall these data highlight even more the importance of this site for this unique grey reef shark aggregation in the region and underscore the need for it to be protected. Interestingly, the satellite tag data also revealed that the shark spent considerable time at the surface.

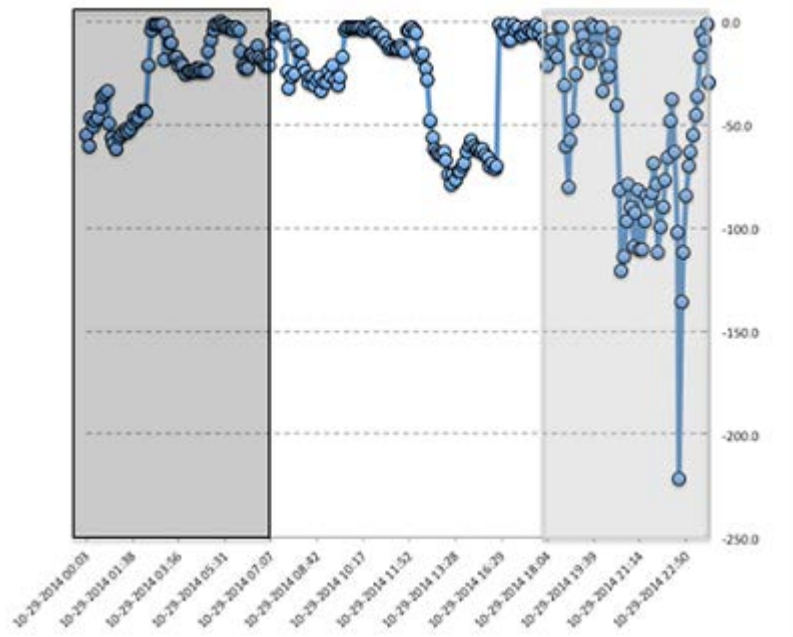


**Figure 1:** Satellite telemetry (158 cm TL pregnant female): High resolution dive profile for one month period. Average depth of shark remains constant over sampling time (~20 m). During October the sharks starts deep diving – this is potentially behavioral thermoregulation? Preferred temperature of grey reef sharks is 26-26.9°C

**Figure 2:** Satellite telemetry (158 cm TL pregnant female): High resolution vertical temperature profile. Average temperature of the environment the shark encounters increases over the sampling period.



**Figure 3:** Acoustic telemetry: Long-term monitoring of two grey reef sharks at Neptunes. Two monitored grey reef sharks are on site all the time but are not seen by divers after December



**Figure 4:** Satellite telemetry (158 cm TL pregnant female): High resolution dive profile for the 24 hour period (29th October 2014) surprisingly shark spends time at surface, interspersed with dives. Deepest dive here recorded during darkness

(2) The video on sharks generated huge interest among the people that have seen it to date. We think a key part of this interest relates to the involvement of local people and the production of the video in Swahili. This created an affinity with local communities and the team felt that community members responded positively viewing sharks in a new light.

High resolution video English/Swahili - [https://youtu.be/P6w8nre\\_8kk](https://youtu.be/P6w8nre_8kk)

Low resolution video Portuguese/Swahili - <https://youtu.be/uX7rTAqULMM>

(3) The workshop provided an important forum to disseminate information not only about the project but also the broader issue of shark management and conservation in Mozambique. Given the audience were from diverse backgrounds (local people, NGOs and government), we were able to relay information to a broad range of stakeholders. Overall the workshop was a huge success, and people were surprised by the quality of information the project was generating and the involvement of local people and communities. Workshop participants commented that they did not realize that such conservation activities were underway in the region, many thought it would not be possible to obtain funding to undertake this type of work. In addition, the customs and finance authorities were not aware of the value and scale of shark finning and also were unaware of international legislation protecting some species (i.e. CITES). Consequently, important information was relayed at a government level.



**Figure 3:** Isabel Marques da Silva presenting the results of the Rufford project



**Figure 4:** Isabel Marques da Silva promoting discussion with participants of the workshop



**Figure 5:** Students of Unilurio that participate in the shark project explaining their participation





Figure 6: Participants of the workshop discussing with one of the students of UniLúrio.

#### **4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).**

Local communities benefited in several ways from the overall project; (i) the dive master from the lodge (from Vamizi community) was trained in acoustic telemetry and participated in all field operations. The dive master continues to be involved in the retrieval, download and redeployment of the acoustic monitor stations; (ii) Meetings with local communities (Vamizi and Kilfufi) were organised before implementing the project to explain the overall aims of the project, the need to do the work and the equipment that was being used. Following field activities, a summary of the actions and results were provided to the same communities; (iii) Local community members were involved in the final workshop and gained information on the role of sharks, their value for tourism and the need to protect and manage them. This was extremely important given sharks are considered a nuisance in the region and; (iv) the community fisheries monitoring component specifically for sharks has been initiated and data collected and reported directly by community members.

#### **5. Are there any plans to continue this work?**

Yes, given the huge success of this preliminary work, it is absolutely necessary to continue. Through using modified fishing methods, we need to increase the number of tagged sharks at the site (we currently have a further seven acoustic tags and four satellite tags) to gain more information on both the aggregation site and how sharks use the regional reef system. In particular, long term monitoring of the pregnant female reef sharks will show how long they remain resident (the acoustic tags have 10 year lifespan) and we aim to elucidate where they drop their pups, i.e. the location of the nursery ground. To achieve this, we need to tag more individual animals and deploy more monitors around the region. We also need to tag sharks with depth-temperature sensors so we can obtain long-term data on their vertical and thermal behaviours to complement the short-term satellite tag data. Overall, these preliminary data have raised regional awareness of the importance of the sharks at this site, but long term data are needed to convince local and government people over the need for protection. The process for implementing protection has been initiated and this will continue

with ongoing field and community work. In particular, visits to Vamizi and Kifuki islands are needed to hold meetings with the communities to obtain the support of ANAC (Conservation Area Authority) and fisheries department. Finally, the fisheries monitoring aspect on elasmobranch landings require long-term data collection to generate a meaningful data set.

**6. How do you plan to share the results of your work with others?**

The video and the final workshop provided important outlets for sharing the results of this project at local and regional scales. Posts regarding fieldwork and project results have been made through the Vamizi conservation project Facebook page providing feedback on an international scale. Project results will be presented at the Western Indian Ocean Marine Science Symposium (WIOMSA) in South Africa in September 2015. In addition, we plan to produce a scientific report in Portuguese and aim to publish two scientific papers in a peer reviewed journal once we have the means to deploy the remaining tags and have more comprehensive telemetry data (e.g. a larger sample size) plus consistent fisheries monitoring data.

**7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?**

The projects followed the schedule organized with the Rufford Foundation. The project was completed within the one year period.

**8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.**

Item	Budgeted Amount	Actual Amount	Difference	Comments
Acoustic tags	1792	1364,3641	427,63592	Further tags were not purchased because we were able to secure more through in kind funding.
Boat fuel	1800	1836,8753	-36,875254	
Transport for meeting in vamizi community	480	650,14222	-170,142219	
Transport for meeting in Kifuki community	320	251,93011	68,0698903	
Materials for meeting	180	101,58472	78,4152783	
Video documentary	500	500	0	
Dissemination Workshop	1000	921,77976	78,2202357	



Flight to shark specialist (not budget)	0	445,32385	-445,323852	Flight for shark tagging specialist to assist with shark fishing and tagging plus training of local Mozambicans
<b>Total</b>	6072	6072	0	

**9. Looking ahead, what do you feel are the important next steps?**

The most important next steps are as follows:

(1) Finance a second shark tagging campaign in September/October 2015 to tag additional sharks with both acoustic and satellite transmitters. It is extremely important to increase the sample size and tag more pregnant female sharks plus smaller individuals (juveniles are present). We will modify fishing methods and extend the field season as detailed above to improve capture rates. We will also use live bait for the fishing.

(2) Expand tagging to include other large threatened fish species. There are very healthy populations of bumphead parrot fish and Napolean wrasse in the region that are of global concern. We aim to tag individuals of these species to develop a multi species tagging programme to provide data to input in to developing a series of regional community protected areas.

(3) Continued engagement of local community members in the overall project to ensure its long-term sustainability and community commitment to its overall conservation goals.

(4) Organise personnel from central and provincial government, ANAC and fisheries visits to visit Neptunes and other local priority sites. This is required in the process of campaigning for Neptunes to be designated as a conservation area, to further highlight the importance of species conservation and local community management and to campaign for broader scale MPA establishment.

**10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?**

Yes, The Rufford Foundation logo was used in the workshop presentation materials, in the video, and in the Facebook presentation of the workshop.

**11. Any other comments?**

We believe that this preliminary work funded by the Rufford Foundation forms a very important step to study and protect an extremely rich area – the Neptunes Pinnacles – in a remote region of northern Mozambique. This site is unique to the WIO in terms of the aggregation of grey reef sharks and overall diversity and biomass of fish including many

globally threatened species. There are exceptionally few data for this region, but oil and gas developments and developing fisheries could impact this ecosystem and this threat continues to grow further. Continued funding for this project, will enable expansion of the ongoing tagging work to include other threatened species, continue community involvement in the overall programme and will facilitate the expansion of marine reserves and no take areas.